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(54) Abstract Title
Tool holder

(57) A tool holder comprises a receiving opening 14 into which a insertion shaft 15 of a tool 16 can be inserted in a non-rotatable fashion in at least two different rotary positions and can be axially locked therein by means of three locking elements 18. Each locking element 18 is housed in an aperture 19a, 19b; 19c, the apertures being offset through a rotary angle relative to one another, and the locking elements 18 engage into the receiving opening 14. The apertures 19a, 19b, 19c and hence the locking elements 18 are circumferentially offset to each other by at least two different angular distances α, β, a first of said locking elements 18 being offset to a second of said locking elements 18 preferably by an angle α equals 135°, and the second locking element 18 being offset to a third of the locking elements 18 preferably by an angle β equals 90°.

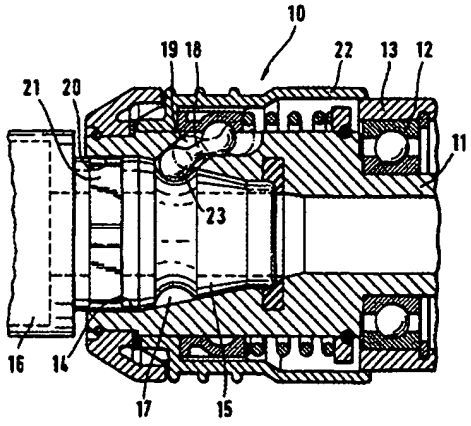

FIG.1

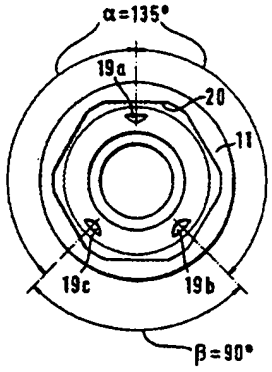

FIG.2

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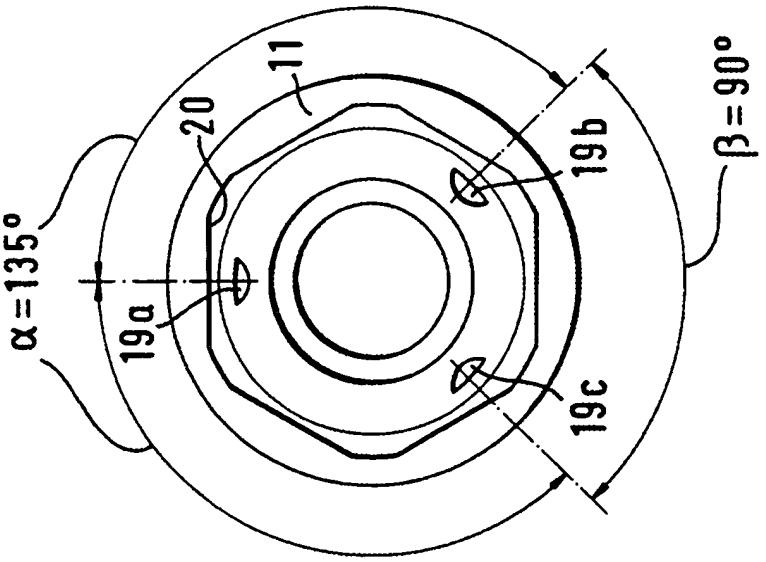

FIG.2

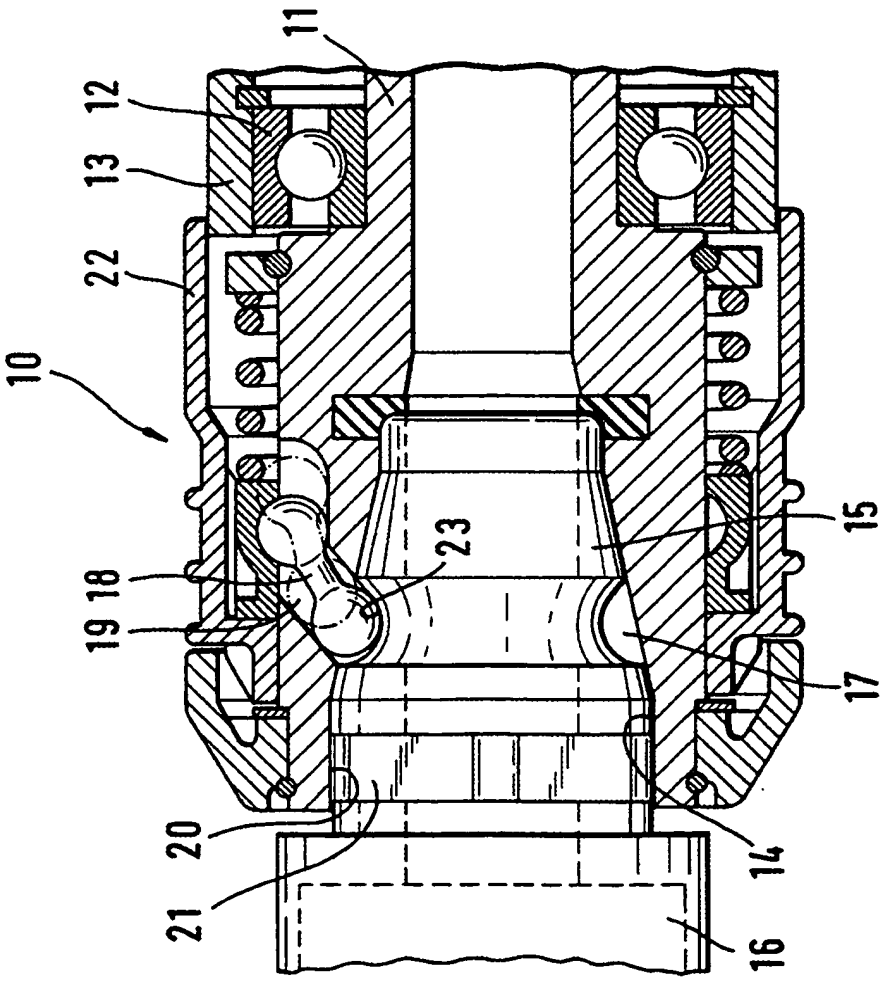

FIG.1

Tool holder for drilling and/or striking tools

State of the Art

The invention proceeds from a tool holder for drilling and/or striking tools according to the preamble of claim 1. A tool holder is already known (DE 95 21 993 A1) which comprises a receiving opening, into which a tool shaft can be inserted in non-rotatable fashion in six or three different rotary positions and can be axially locked therein by means of two locking elements offset through a rotary angle of 180° relative to one another and engageable in the receiving opening. As a result of the uniform angular arrangement of the locking elements, the latter always come to rest against the insertion shaft at the same location. Depending on the hardness of the tool shaft and/or the locking elements, frustum-shaped indentations form more or less rapidly, which can result in premature wear of the insertion shaft and is therefore to be avoided.

Advantages of the invention

The tool holder according to the invention having the features of claim 1 offers the advantage over the state of the art that the formation of undesirable wear manifestations on the tool shaft as a result of the engagement of locking elements is reduced.

As a result of the measures disclosed in the dependent claims, advantageous further developments and improvements to the tool holder according to the invention are possible.

Drawings

An embodiment of the invention is illustrated in the drawings and explained in further detail in the following description. Figure 1 is a longitudinal section through a drilling device with fitted drilling tool and Figure 2 is a plan view of the receiving opening of the tool holder.

Description of the embodiment

In Figure 1 the reference numeral 10 designates a tool holder of a drilling device. The tool holder 10 has a base element 11, which is rotatably mounted in a machine housing 13 via a bearing 12. The tool holder 10 can also be constructed as an adapter which is detachable from the machine tool.

A receiving opening 14, into which an insertion shaft 15 of a drilling tool 16 is fitted, is constructed in the base element 11 at the end facing the tool. Disposed in the insertion shaft 15 is a locking recess, for example an annular groove 17, in which three locking elements 18 engage, one of which is shown in section in Figure 1. The locking elements 18 are used for the axial locking of the tool 16 in the tool holder 10. The locking elements 18 together with the tool shaft 15 form abutment points 23, in which plastic deformations can be produced after long-term operation as a result of vibrations as a function of the hardness of the locking elements 18 and tool shaft 15.

A hexagonal inner profile 20 on the base element 11, which corresponds to a matching, hexagonal outer profile 21 on the insertion shaft 15 is used for the rotary drive of the tool 16. As a result of the hexagonal rotary drive, the insertion shaft can be inserted into the receiving opening 14 so as to be locked against rotation in six different rotary positions. Other drive devices can, of course, be used for the rotary drive, e.g. drive strips which engage in associated drive grooves. If, for example,

three like drive strips are uniformly distributed in the circumferential direction, then the tool shaft can be inserted in three different rotary positions.

Figure 1 shows a locking position of the tool 16. In order to unlock the tool 16, an actuating sleeve 22 enclosing the base element 11 is to be axially displaced or optionally rotated in known manner, the locking element 18 thereby disengaging from the annular groove 17. The drilling tool 16 can then be removed from the receiving opening 14.

As already mentioned, a total of three locking elements 18 are provided, which engage in the annular groove 17 in the locking position of the tool 16. Viewed in the circumferential direction of the receiving opening 14, the locking elements 18 are arranged at different angular distances from one another.

Figure 2 shows the angular distances of the apertures 19, which correspond to the angular distances of the locking elements 18 arranged therein. Provided between a first aperture 19a and a second aperture 19b is an angular distance of $\alpha = 135°$, which is also the angular distance provided between a third aperture 19c and the first aperture 19a. An angular distance of $\beta = 90°$ therefore remains between the second aperture 19b and the third aperture 19c. As a result of the non-uniform angular distances, it is ensured that the locking elements 18 rest against different abutment points 23 in the annular groove 17 of the insertion shaft 15 following replacement and subsequent reinsertion of the insertion shaft 15. A substantially larger number of abutment points 23 is provided overall for the locking elements 18 in the annular groove 17 than in the case of a uniform distribution of the locking elements 18 with an angular spacing of 120°.

For example, if a total of three different rotary positions are possible, in which the insertion shaft can be inserted, there would only be a total of three different abutment

points 23 in the annular groove 17 in the case of a uniform distribution of the locking elements 18 over the circumference of the receiving opening 14. However, in the case of a non-uniform distribution according to the illustrated embodiment of the invention, there are already nine different abutment points 23, which results in a mathematical reduction in the wear at each individual abutment point 23 by a factor of 3. Thus, as a result of the invention, more uniform wear of the annular groove 17 is ensured, which increases the overall service life of the insertion end 15.

The invention is not restricted to the illustrated embodiment. Advantages can, of course, also be achieved using two or more than three locking elements 18. Thus, the number of abutment points 23 in the annular groove 17 of the insertion shaft 15 can be doubled in cases where there are only two locking elements by arranging the locking elements 18 at non-uniform angular distances. In the case of three locking elements, the wear at the abutment points 23 can also be reduced by a total of three different angular distances.

CLAIMS

1. Tool holder for a drilling and/or striking tool, comprising a receiving opening (14), into which an insertion shaft (15) of a tool (16) can be inserted in non-rotatable fashion in at least two different rotary positions and can be axially locked therein by means of at least two locking elements (18) offset through a rotary angle relative to one another and engaging in the receiving opening (14), characterised in that, viewed in the circumferential direction of the receiving opening (14), the at least two locking elements (18) are arranged at at least two different angular distances (α, β) relative to one another.

2. Tool holder according to claim 1, characterised in that three apertures (19) for a total of three locking elements (18) are provided in the circumferential direction of the receiving opening (14), an equal angular distance of preferably α = 135° being provided between a first aperture (19a) and a second aperture (19b) and between the first aperture (19a) and a third aperture (19c), whilst a smaller angular distance of preferably β = 90° is provided between the second aperture (19b) and the third aperture (19c).

3. A tool holder substantially as herein described with reference to the accompanying drawing.

The Patent Office

Application No:	GB 9803869.8	**Examiner:**	Vaughan Phillips
Claims searched:	1-3	**Date of search:**	20 March 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): B3B (BHS1, BHS2, BHS6, BHS9); B4C

Int Cl (Ed.6): B23B

Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2302300 A (BOSCH) see whole document	-

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.